BIBLIOGRAPHY

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ABSTRACT

This study was conducted at Central Pico, La Trinidad Benguet from October 2012 to December 2012 to determine the response of native chicken to phytase when added into their diet. Specifically, the study aimed to determine the response of native chickens to the phytase in terms of gain in weight, feed consumption, feed conversion ratio, and morbidity and mortality rates; and, to determine the profitability of raising native chicken when fed with diets supplemented with phytase.

The two treatments were T_0– without phytase supplementation and T_1- with phytase supplementation. The results of the statistical analysis showed no significant differences in terms of the initial and final weights, gain in weight, feed consumption, feed conversion ratio and dressing percentage.

Even though the net income and return on investment (ROI) were not subjected to statistical analysis, results of study showed that native chicken given commercial feed + corn grits obtained higher ROI compared to the birds given phytase. It is therefore concluded that supplementing the ration (50% corn grits + 50% commercial feed) of native chickens with phytase at the level of one gram per kg feed did not improve the growth performance of the native chickens.

INTRODUCTION

Native chicken raising is one of the oldest farming practices in the Cordillera Region. Native chicken are raised mainly for food consumption. Native chicken meat is a good source of high quality protein. They are also raised for barters and especially for religious rituals. Because of the unique attributes such as distinct flavor, higher degree of leanness and more intense pigmentation, consumers prefer to patronize the product (Kibatay, 1999). Farmers prefer to raise native chicken because they don't need extra time and care and they can be maintained easily. They require no special feeds yet they can provide eggs and meat. Occasionally they are capable of self-supporting in the sense that they are contented with rice left-over and other plant leaves around them. Native chickens are resistant to different diseases and can thrive to any adverse environmental conditions (Suayan, 2007).

However, farmers are not satisfied with the performance of their native chicken. They want their chickens to grow fast at a shorter period of time. One factor that affects the slow growth of the native chicken is the inabsorption of some of the minerals and protein from the feeds they eat. The inabsorption is affected by phytate (phytic acid). McDonald, *et. al.,* (2002) stated that phytate is biologically unavailable to non-ruminant animals like chicken because they do not produce the phytase. Monogastric animals do not carry bacteria that produce phytase, thus these animals cannot use phytic acid as a major source of phosphorus and it is excreted in the feces.

Phytase provides natural phosphorus source from phytate in feedstuff. It increases the utilization of mineral and protein and other nutrients. Phytase reduces the environmental pollution caused by unused phosphate and most of all; it improves the livestock performance (Genofucos. Inc., 2012).

Because of the above reasons, it is the aim of the researcher to find out the effect of phytase, a commercial feed additive, on the growth performance of the native chickens.

The result of the study can serve as a guide to native chicken raisers to improve their production. It can also serve as a guide or reading material to students or other researchers if they come up with other related studies.

The main objective of the study was to determine the response of native chicken to phytase when added into their diet. Specifically, this study was conducted to: determine the response of native chickens to the phytase in terms of gain in weight, feed consumption, feed conversion ratio, and morbidity rate; and to determine the profitability of raising native chicken when fed with diets supplemented with phytase.

The study was conducted at Central Pico, La Trinidad Benguet from October 2012 to December 2012.

REVIEW OF LITERATURE

In 2000, PCARRD reported that traditionally raised native chicken weigh one kilogram when they are 18-20 weeks old but under improved management and nutrition native chicken weigh one kilogram as early as 12 weeks old. Bacod (2007) cited that the growth rate of native chicken was 889 grams. The average body weight was 31 grams at day old. Chickens weighed an average of 106 gram at 2 weeks, 259 grams at 4 weeks, 371 grams at 6 weeks and 536 grams at eight week. Garcia (2006) cited that the adult size of native chicken is usually small. Generally, the male weighs an average of 1.3 kilograms and the female weighs one kilogram.

Roselina and Applegate (2002) mentioned that the primary constituents of diets for poultry are plant-based ingredients which come primarily from the seeds of plants. Most of the stored phosphorus in plants is found in seeds mainly as a component of phytin. Phytin-phosphorus is poorly available to poultry and this availability varies both within and among the ingredients. The enzyme phytase releases phosphate from phytin potentially making this released phosphorus available to the animal. Phytase is the only recognized enzyme that can initiate the release of phosphate from phytin, this speed up the chemical reactions. Genofucos Inc. (2012) mentioned that inorganic phosphorus are relatively high digestible than that of the plant one, so this is usually added to feed ration. However, the addition of inorganic phosphate is an additional cost. The Genofucos Inc. mentioned also that the recommended dosage of the phytase when used in animals is as follows: for laying hens is 60g/ton, for broilers is 100 g/ton, for swine is 100 g/ton; and for others is 100 g/ton.

Phytase is an enzyme that breaks down the indigestible phytic acid (phytate) portion in grains thereby, releasing the digestible phosphorus and calcium. It is an enzyme that is

employed to destroy materials that interfere with the digestion, absorption and utilization of nutrients (McDonald *et al.,* 2002). Adding phytase to animal feeds makes grain phosphorus more available to animals, thereby reducing the amount of supplemental phosphorus needed for optimum animal performance. Most of the phosphorus present in grain fed to livestocks is phytate-phosphorus. This organic phosphorus form is not readily available to animals, particularly to monogastric animals like poultry (Smith and Joern, 2003).

Graham *et al.,* (2011) stated that phytase is present in over 60% of monogastric feed, and possibly even in the higher percentage of poultry diets. Phytase has mainly been considered to be a tool to increase phosphorus availability/digestibility from vegetable sources and to reduce the inclusion of higher cost of phosphorus sources. Phytase releases the phosphorus bound in the phytase molecule, increasing the availability/ digestibility of this mineral to the animal. Thus, increasing the inclusion rate of phytase would be expected to release additional phosphorus from the indigestible feed phytate and consequently allow an even greater substitution of higher cost of phosphorus sources.

Additionally, for an enzyme to work, it must be in proximity to the substrate, and the substrate cannot have the site of action blocked in certain regions of the gastro intestinal tract (small intestine). Phytin can react readily with other compounds such as calcium, iron, copper, zinc and precipitate out of solution such that the enzyme cannot act on this precipitated substrate. In other areas of the gastro intestinal tract (proventriculus and gizzard), phytin is more soluble and can readily be acted upon by the phytase enzyme (Roselina and Applegate, 2002).

The addition of phytase to a diet by at least 1 g/kg improves phosphorus digestibility. This leads to a saving of about 5 to 6 kg of in organic phosphorus (Kleyn, 2012). A higher enzyme dose increases the nutrient absorption and animal performance. One study provided high doses of phytase for broilers in the diet with phosphorus level of 0.25% and observed improve performance. Another study is giving higher dose of phytase using diets with normal levels of phosphorus have already shown better poultry performance (Graham *et al*., 2011).

Saylor (2012) has confirmed that the chickens are digesting more of the phosphorus, an essential nutrient, in their feed due to the addition of phytase, a natural enzyme.

Phytase can increase the growth rate and improves the feed conversion ratio of the broilers. It can replace 0.10% of effective phosphorus approximately 65%of inorganic phosphorus. In pigs, it can also increase the growth rate and improves the feed conversion ratio. It can replace 0.13% of effective phosphorus that is approximately 60% inorganic phosphorus (Graham *et al*., 2011).

Molitas (1999) added that native chicken under reared cages and commercialy fed has higher feed consumption than chickens that are raised loose and traditionaly fed.

MATERIALS AND METHODS

Materials

The materials used in this study were twenty four (thirty-days-old) native chicks, phytase enzyme, commercial feeds, corn grits, feeders and waterers, weighing scale, pens, disinfectants, record book, and ball pen.

Methodology

Preparation of the experimental pens. The rearing cages were divided into six compartments to accommodate six groups of birds. The feeders and waterers were cleaned and disinfected with lysol solution. Electric bulbs were installed in each division to provide heat and light needed by the birds.

Procurement of stock. The experimental birds were purchased from Sagada, Mountain Province. The birds were purchased earlier and brought to La Trinidad a week before the start of the study for them to adjust to the new environment.

Experimental design and treatments. Using the completely randomized design (CRD), the birds were distributed into two treatments. Each treatment was replicated three times with four chicks per replication

The two treatments were as follows:

T_0- without phytase supplementation (control)

T_1- with phytase supplementation

However, before the birds were placed into their respective cages, their individual weights were taken and recorded.

Feeding and watering. All the birds were subjected to the same management except on the diets offered to them. Birds in the control group were fed with 50% corn grits plus 50% commercial feeds. The birds under treatment 1 were also fed with 50% corn grits plus 50% commercial feeds but this was supplemented with phytase (Figures 1 and 2). The phytase given was supplemented at the level of 1 g/kg of commercial feeds which is the recommendation of the manufacturer (Genofucos, Inc., 2012). The phytase was given to the birds from the start of the study at 30 days old until the birds were 90 days old or for a feeding period of 60 days. Feeding was *ad libitum* and done two times a day at 6:00-7:00 am and 4:00-5:00 pm.

The weight of the feeds given to the birds per treatment each day was recorded. Similarly, the weights of the daily left-over feeds were recorded and were subtracted from the feeds offered to obtain the daily feed intake of the birds. Since mixing of the phytase to the commercial feed was done manually, this was mixed thoroughly to small amounts of feeds first and then additional feeds was added into the mixture little by little while mixing. Clean fresh water was available at all times. Cleaning and refilling of waterers were done once in the morning and once in the afternoon.

Slaughter procedures. Before dressing, the birds were fasted for 12 hours but water was given *ad libitum*. Live weight was taken before dressing. Birds were secured by a helper holding both shanks with one hand and both wings with the other hand before sticking. The birds were raised about 45^0 to allow complete bleeding.

Defeathering was performed by washing first the birds in cold water and immersing them in the scalding water with a temperature ranging from 80^0C -87^0C. Plucking of feathers

followed after which, the carcass was washed and now ready for fabrication. The head, feet, and viscera were detached from the carcass ready for carcass weighing.

Figure 1. Sample of the phytase enzyme used in the study

Figure 2. Sample ration (50% commercial feed + 50% corn grits) given to the native chickens

Data Gathered

1. Initial weight (kg). This was obtained by weighing the birds individually at the start of the study or at30 days of age (Figure 3).

2. Final weight (kg). This was taken by weighing the birds at the end of the study or after a feeding period of 60 days (Figure 4).

3. Feed offered (kg). This was the amount of feeds given to the chicken each day.

4. Left- over feeds (kg). This was the amount of feeds not consumed by the birds which was collected every morning before feeding the chicken.

5. Cost of production (Php). This includes the cost of the stocks and other materials used in the study.

5. Slaughter weight (kg). This was obtained by taking the weight of the birds prior to slaughter.

6. Carcass weight (kg). This was obtained by taking the weight of the carcass without the head and feet.

Data Computed

1. Total gain in weight (kg). This was taken by subtracting the initial weight from the final weight.

2. Total feed consumption (kg). This was obtained by adding the daily feed consumption of the birds from the start to the end of the study.

3.Feed conversion ratio (FCR). This was computed by dividing the total feed consumption by the total gain in weight.

Figure 3. Weighing the birds at 30 days of age

Figure 4. Weighing the birds after a feeding period of 60 days

4. Mortality rate (%). This was computed using the formula:

$$MR = \frac{\text{Number of dead birds}}{\text{Total number of birds}} \times 100\%$$

5. Total cost of production (Php). This was taken by adding all the expenses incurred per treatment from the start of the study until the end.

6. Net profit (Php). This was obtained by subtracting the cost of production from the gross sales.

7. Return on Investment (%). This was computed using the following formula:

$$ROI = \frac{\text{Net Profit}}{\text{Total cost of Production}} \times 100\ \%$$

8. Dressing Percentage (%). This was obtained by dividing the carcass weight by the slaughter weight multiplied by 100 percent.

Data Analysis

All data gathered were consolidated, tabulated and analyzed using the T-test.

RESULTS AND DISCUSSION

Body Weights

The initial and final weights of the birds in the two treatments are shown in Table 1. Statistical analysis revealed that there were no significant differences between the two treatment means. The mean initial weight of the birds in the two treatments was 175 grams.

Similarly, no significant difference between the two treatment means was observed as revealed by the statistical analysis. This shows that all the experimental birds were more or less of the same weights at the end of the study. The mean final weight was 1.082 kg.

Total Gain in Weight

Table 2 presents the total gains in weight of the birds in the two treatments there is a slight is difference between the two treatment means was noticeable, however, such difference was considered small to cause a significant effect as revealed by the statistical analysis.

Table 1. Initial weight of the birds at 30 days old and final weight at 90 days old

TREATMENT	INITIAL WEIGHT (g)	FINAL WEIGHT (kg)
Without phytase supplementation	175[a]	1.065[a]
With phytase supplementation	175[a]	1.099[a]

Means with the same letter are not significantly different at 5% level, DMRT.

This implies that the birds in the two treatments had more or less the same gains in weight. It also implies that the phytase added to the ration of the native chickens at the levels of 1 g/kg feed did not increase the gain in weight of the birds.

Total Feed Consumption

Table 3 shows the total feed consumptions of the birds in the two treatments. Statistical analysis revealed that there were no significant differences between the two treatment means. This implies that the birds in the treatments had consumed more or less the same amount of feed. It is also revealed that the incorporation of phytase enzyme into the bird's diet did not affect their feed consumption. The overall mean feed consumption of the birds in the two treatments was 5.978 kg.

Table 2. Total gains in weight of birds in the two treatments

TREATMENT	TOTAL GAIN (kg)
Without phytase supplementation	0.890[a]
With phytase supplementation	0.921[a]

Means with the same letter are not significantly different at 5% level, DMRT.

Table 3. Total feed consumptions of the birds in the two treatments

TREATMENT	TOTAL FEED CONSUMPTION
Without phytase supplementation	5.834[a]
With phytase supplementation	6.122[a]

Means with the same letter are not significantly different at 5% level, DMRT

Feed Conversion Ratio

Table 4 shows the amounts of feeds eaten by the birds to produce a unit gain in weight. The Table further shows that birds given no phytase supplementation had a mean of 6.653 while the birds given phytase had a mean 7.078.

Statistical analysis revealed no significant difference between the two treatment means. This means that birds had more or less eaten the same amount of feeds to produce a kilogram increase in body weights. According to Graham *et. al*. (2011), phytase can increase the growth rate and improved the feed conversion ratio of the birds but this was in broilers or fast growing birds. It may not be true to native chickens as revealed by the result of the experiment.

Morbidity and Mortality Rate

There was neither mortality nor even morbidity rate observed among the birds in the two treatments. This result showed that adding phytase to the ration of the birds had no adverse effect on the health of the birds.

Table 4. Feed conversion ratio

TREATMENT	FCR
Without phytase supplementation	6.653[a]
With phytase supplementation	7.078[a]

Means with the same letter are not significantly different at 5% level, DMRT.

Dressing Percentage

The dressing percentages of the birds in the two treatments are presented in Table 5. Statistical analysis showed that there was no significant difference between the two treatment means. This implies that the dressing recovery of native chickens was not affected by the addition of phytase into their diets.

The overall mean of the dressing percentage of the birds in the two treatments was 69.028%. This is lower compared to the dressing percentage of native chicken obtained by Donguez (2004) which was 72.21%, however, the birds slaughtered in this study were 6 months old. In this study, the birds slaughtered were at 3 months old and the weights of the head, and feet were not included.

Return on Investment

Table 6 presents the cost of production and returns on investment in raising the birds in the two treatments and the particulars are presented in Appendix Table 7. Though the ROI was not subjected to statistical analysis, higher retuns was realized fron the birds given no phytase which had 8.03%. On the other hand, the birds given phytase had an ROI of 6.78%. Based on the above results, it is revealed that the addition of phytase into the birds diets was just an additional expense because there was no improvement on the growth performance of the birds was observed and hence, the lower ROI also.

Table 5. Dressing percentage of the birds in the two treatments

TREATMENT	SLAUGHTER WEIGHT	CARCASS WEIGHT	DRESSING PERCENTAGE
Without phytase supplementation	1.025	0.706	68.883
With phytase supplementation	1.048	0.725	69.173

Means with the same letter are not significantly different at 5% level, DMRT.

Table 6. Cost of production and return on investment observed from the birds in the two treatments

TREATMENT	TOTAL SALES (Php)	TOTAL COST (Php)	NET INCOME (Php)	ROI (%)
Without phytase supplementation	4473	4140.608	332.392	8.03%[a]
With phytase supplementation	4614.4	4321.328	293.073	6.78%[a]

Means with the same letter are not significantly different at 5% level, DMRT.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The study was conducted to determine the response of native chicken to phytase when added into their diet. The birds used in the study were twenty four (30 days old) native chicks. This was conducted at Central Pico, La Trinidad Benguet from October 2012 to December 2012.

Specifically, the study aimed to determine the response of native chickens to phytase in terms of gain in weight, feed consumption, feed conversion ratio, morbidity and mortality rates; and to determine the profitability of raising native chicken fed with diets supplemented with phytase.

Following the completely randomized design (CRD), the birds were randomly distributed into two treatments. Each treatment was replicated three times with four birds per replication making a total of 12 birds per treatment. The two treatments used were as follows: without phytase supplementation (T_0) and with phytase supplementation (T_1).

The results of the statistical analysis showed no significant differences in terms of the initial and final weights, gain in weight, feed consumption, feed conversion ratio and dressing percentage.

On the returns on investment, though this was not subjected to statistical analysis, results revealed that a lower ROI was realized from the birds given phytase supplementation because of the additional expense on phytase.

Conclusion

Based on the results of the study, it is therefore concluded that supplementing the diets of native chickens with phytase did not improve their gains in weight and feed efficiency.

Recommendations

Since birds from control treatment and birds given phytase did not vary significantly, supplementing the native chicken's diet (50% commercial feed + 50% corn) with phytase is not recommended.

However, it is recommended that studies should be conducted to include other strains of birds or using the same strains of birds with more treatments and replications. Also, related studies should be conducted to determine the effect of adding phytase into the bird's diet on the carcass quality

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